Amendments to the Specification

Amend the title as shown below in marked form:

~~COATING DEVICE AND~~ METHOD FOR IMPROVING THE UNIFORMITY OF A WET COATING ON A SUBSTRATE USING AT LEAST TWO WIRE-WOUND RODS

Amend paragraphs 0001, 0005, 0006, 0030, 0043, 0047 and 0060 as shown below in marked form:

[0001] This application is a continuation-in-part of pending U.S. Patent Application Serial No. 09/757,955 filed January 10, 2001, entitled COATING DEVICE AND METHOD (now U.S. Patent No. 6,737,113 B1), the entire disclosure of which is incorporated by reference herein.

[0005] The above-mentioned ~~'955 Application~~ '113 Patent describes coating devices and methods in which repeating and random coating defects are eliminated or at least significantly reduced through the use of pick-and-place contacting devices. Rotating rolls (and especially undriven rolls that can co-rotate with a coated substrate as it passes by the rolls) are a preferred type of pick-and-place device in the ~~'955 Application~~ '113 Patent. Especially preferred are differently sized rolls, or rolls operated at different speeds, with the sizes or speeds (and thus the periods of contact, defined as the time between successive contacts by a point on the device with the substrate) not being periodically related to one another. The uniformity of a coating on a substrate is improved by contacting the coating at a first position with the wetted surfaces of the periodic pick-and-place devices, and re-contacting the coating with such wetted surfaces at positions on the substrate that are different from the first position and not periodically related to one another with respect to their distance from the first position. The coating devices and methods of the ~~'955 Application~~ '113 Patent can provide extremely uniform coatings and extremely thin coatings, at very high rates of speed.

[0006] Pending U.S. Patent Application Serial No. ~~(Attorneys Docket No. 55476US003)~~ 10/044,237 filed even date herewith and entitled COATING DEVICE AND METHOD USING PICK-AND-PLACE DEVICES HAVING EQUAL OR SUBSTANTIALLY EQUAL PERIODS, the entire disclosure of which is incorporated by reference herein, describes additional coating devices and methods using pick-and-place devices whose periods of contact with a substrate are equal or substantially equal to one another.

[0030] Further details regarding the basic principles of operation of the devices of the invention are shown in detail in the above-mentioned ~~'955~~ '113 Patent and '237 Application ~~and Application Serial No. (Attorneys Docket No. 55476US003)~~.

[0043] The basic principles of operation of the devices shown in **Fig. 7** through **Fig. 9** are further described in pending U.S. Patent Application Serial No. ~~(Attorneys Docket No. 56445US002)~~ 10/044,276 filed even date herewith and entitled SHEET COATER, the entire disclosure of which is incorporated by reference herein. Sample sheet coating can be accomplished using such devices by initially mounting sheet **124** on roll **120** using a suitable mounting technique. If sheet **124** has suitable dielectric properties, then static electrical forces usually will be sufficient to hold sheet **124** in place without other fastening measures being required. Next, roll **120** is placed adjacent coating rods **112** and **114** (and other coating rods if present), so that sheet **124** is nipped between roll **120** and the coating rods. The total volume of coating liquid needed to achieve the desired coating caliper can be calculated in advance. Assuming equal film splits at the nip points, e.g., the nip points **132** and **134** in **Fig. 7**, the total coating liquid volume will equal the desired caliper times the wetted surface area. This wetted surface area will equal the wetted surface of all the coating rods, e.g., coating rods **112** and **114**, plus the wetted surface on roll **120**. The desired volume of coating liquid is next applied as one or a plurality of liquid stripes across the length of at least one of the coating rods, e.g., coating rod **112** or **114**, or across the face of sheet **124** on roll **120**. The coating liquid application can conveniently be carried out by flowing the coating liquid through needle **144** while needle **144** traverses back and forth. By varying the number of stripes and the flow rate from

needle **144**, the desired final caliper on sheet **124** can be very accurately controlled. The applied coating liquid stripes can be placed in random or in specific locations on a coating rod or rods or on sheet **124**. Improved uniformity for a set number of rotations can be achieved if the stripe width and placement are appropriately optimized. Stripe coating is preferred over attempting to apply a uniform coating to a coating rod or to sheet **124**, because it is much easier to apply a nonuniform coating of thicker stripes than to apply a uniform thin coating. The flow rate of the liquid preferably is held constant during application in order to promote good cross web uniformity in the final coating. The initial lengthwise uneven coating on the coating rod or on sheet **124** is converted to a uniform coating by causing roll **120** to revolve for a plurality of revolutions, whereupon wetted and to be wetted surface portions of the sheet **124** and the coating rods will contact and re-contact one another at successively different positions. This causes the coating liquid to be picked up from and replaced onto the sheet **124**. The coating quickly becomes much more uniform. For example, in the device shown in **Fig. 9**, when the variable speed drive motor **172** is energized then the coating rods **112** and **114** and mounting roll **120** all rotate at approximately the same surface speed. A very uniform caliper coating is obtained by rotating roll **120** for a suitable number of revolutions (e.g., 10 or more, 20 or more or even 100 or more revolutions) and by exercising appropriate control of the applied stripe width and coating rod periods of rotation. Following completion of the desired number of revolutions, sheet **124** is removed from roll **120** and permitted to dry or harden if required. To assist in removal of sheet **124**, roll **120** can be lifted away from the device of the invention and placed on a suitable stand or benchtop. However, due to the weight of roll **120**, it may be somewhat difficult to pick up roll **120** by hand. The devices of the invention can be equipped with a suitable lifting device (e.g., pneumatically-operated lifting jacks that raise roll **120**) to assist in removal of sheet **124**.

[0047] The coating liquid can initially be applied in a variety of uneven patterns other than stripes, and by using methods other than the oscillating needle applicators discussed above. For example, a pattern of droplets can be sprayed onto the substrate or onto a coating rod using a suitable non-contacting spray head or other drop-producing device. Examples of suitable drop-producing devices include point source nozzles such as airless, electrostatic, spinning disk and pneumatic spray nozzles. Line source atomization devices

are also known and useful. The droplet size may range from very large (e.g., greater than 1 millimeter) to very small. The nozzle or nozzles can be oscillated back and forth, e.g, in a manner similar to the above-described needle applicator. Particularly preferred drop-producing devices are described in pending U.S. Patent Application Serial Nos. 09/841,380 entitled ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD and 09/841,381 entitled VARIABLE ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD (now U.S. Patent No. 6,579,574 B1), both filed April 24, 2001, the entire disclosures of which are incorporated by reference herein.

[0060] Following passage through the improvement station, the very discontinuous initially applied coating was transformed to a continuous, void-free ~~continuous~~ coating. The improvement could be seen by visibly inspecting the web before and after each coating rod. At the first coating rod a diagonal, cross web stripe approached and then passed beneath the co-rotating coating rod. Upon exiting from the web-to-rod contact zone, a portion of the liquid remained on the surface of the first coating rod and a portion remained with the web. The liquid stripe was transformed into two separate images, one on the first coating rod and one on the web. The image on the first coating rod subsequently recontacted a new position on the web as the first coating rod revolved one revolution, creating a second image upon the web with reduced caliper. In a similar manner the coating liquid stripe and its subsequent images were split between the web and the remaining coating rods, recontacted the web at new locations, and produced additional images with further reduced calipers. This repeating contacting, splitting and re-contacting produced a continuous void-free coating with excellent caliper uniformity.